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UNITED STATES GOVERNMENT

memorandum

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DATE: August 28, 1992
REPLY TO
ATTN OF: Paul L. Marrangoni
SUBJECT: Ex Parte Presentation GEN Docket 90-314
TO: The Secretary

On August 27, 1992, an Henry Geller and Ira Barron presented an ex parte presentation to the Chief Engineer, Dr. Thomas P. Stanley. The following staff members were also in attendance: Robert Ungar, David Siddall, Fred Thomas, Maura McGowan and Paul Marrangoni.

Please enter this memo and the attached written material presented at the meeting into GEN Docket 90-314.

Paul L. Marrangoni

Introduction

- **Present Commission's Goals for PCS**
- **Describe the Commodity Approach**
 - Design goals
 - Spectrum segmentation
 - Architecture
 - Markets and business relationships
- **Discuss the Commodity Approach's relationship to FCC goals**
- **Address the challenges posed by Commodity PCS**

The Commission's Goals

“We intend to ensure that all mobile services are provided with the highest quality at low-cost, reasonable rates to the greatest number of consumers, consistent with the goals of the Communications Act.”

- **Optimize and balance Four values:**

- Universality
- Speed of deployment
- Diversity of services
- Competitive delivery

The Commodity Approach (focuses on mass market)

- **Propose separating long-lived mass market solutions from fast flexible niche market ones**
- **Commodity PCS separates PCS into 3 business segments**
 - Radio port access
 - Local distribution
 - Service to the customer
- **No barriers to entry -- business decisions only**
 - Technical requirements, not exclusive license assignments enables sharing and limits interference
- **Open interfaces between each segment**
- **Facilitate competition in each segment**
- **Low barriers to entry**

Segment spectrum to support the following applications:

- **Wireless LANs (ethernet throughput) [1910-1920]**
- **Commodity PCS (low-power wireless voice and data, \leq ISDN BRI)**
 - Cordless telephones [1920-1925]
 - Wireless PBX [1920-1925]
 - Pedestrian PCS (today the "microtac" market) [800 and 2 GHz]
- **Vehicular cellular [800 and 2 GHz]**
- **LEOSAT [?]**

Low Power versus High Power

- **Low power is more spectrally efficient**

$$\text{available channels} = \frac{1}{\sqrt{\text{power}}}$$

- 20 mW handsets with 30 feet antennas is 100 times (2 orders of magnitude) more spectrally efficient than the 2 W, 300 foot antenna limit discussed in ¶ 115.

- **Low power enables cheaper handsets**

- Power and components

- Reducing cell radius by four decreases power requirements by 256 (urban Hata) $\text{battery life} \propto r^4$
 - Reduced power allows for smaller cheaper components and simpler designs.

- **High Power achieves universality more quickly**

- At low densities, high power is cheaper
 - At high densities, low power is cheaper

- **High Power and Low Power don't share spectrum well**

- I, Greenstein, and Gitlin concluded that the most efficient way to mix high and low power was to segment spectrum.

- With proposed § 99.409 (a) allowing a 47 dBu spill-over adjacent low power licensees are disadvantaged, incenting licensees to use high power.

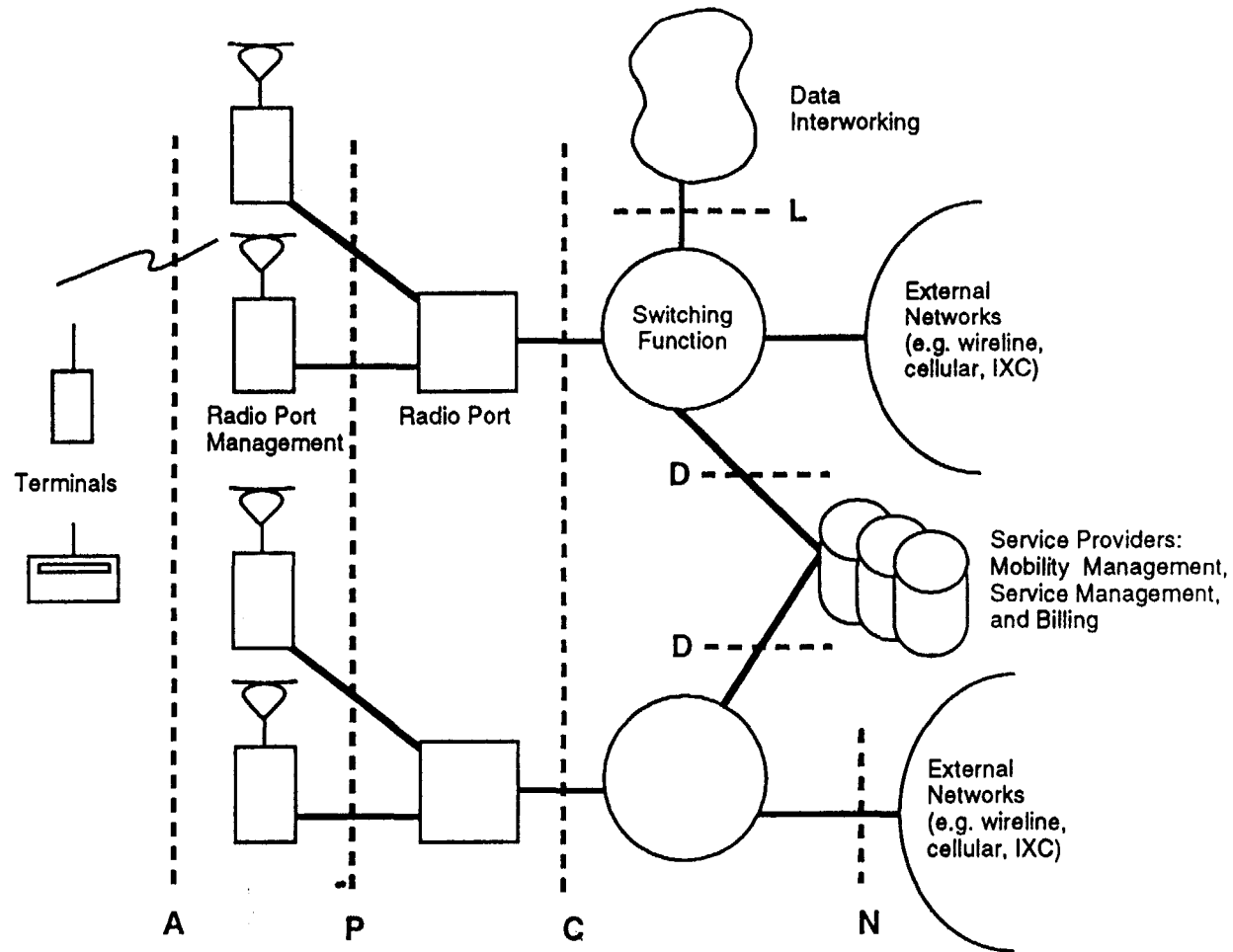
How Much Spectrum?

- Incumbent sharing issue
- Allowable power limits
- Number of simultaneous radio port providers to be supported
- Anticipated erlangs
- Does the protocol supports inter-provider link transfer
- Desired quality

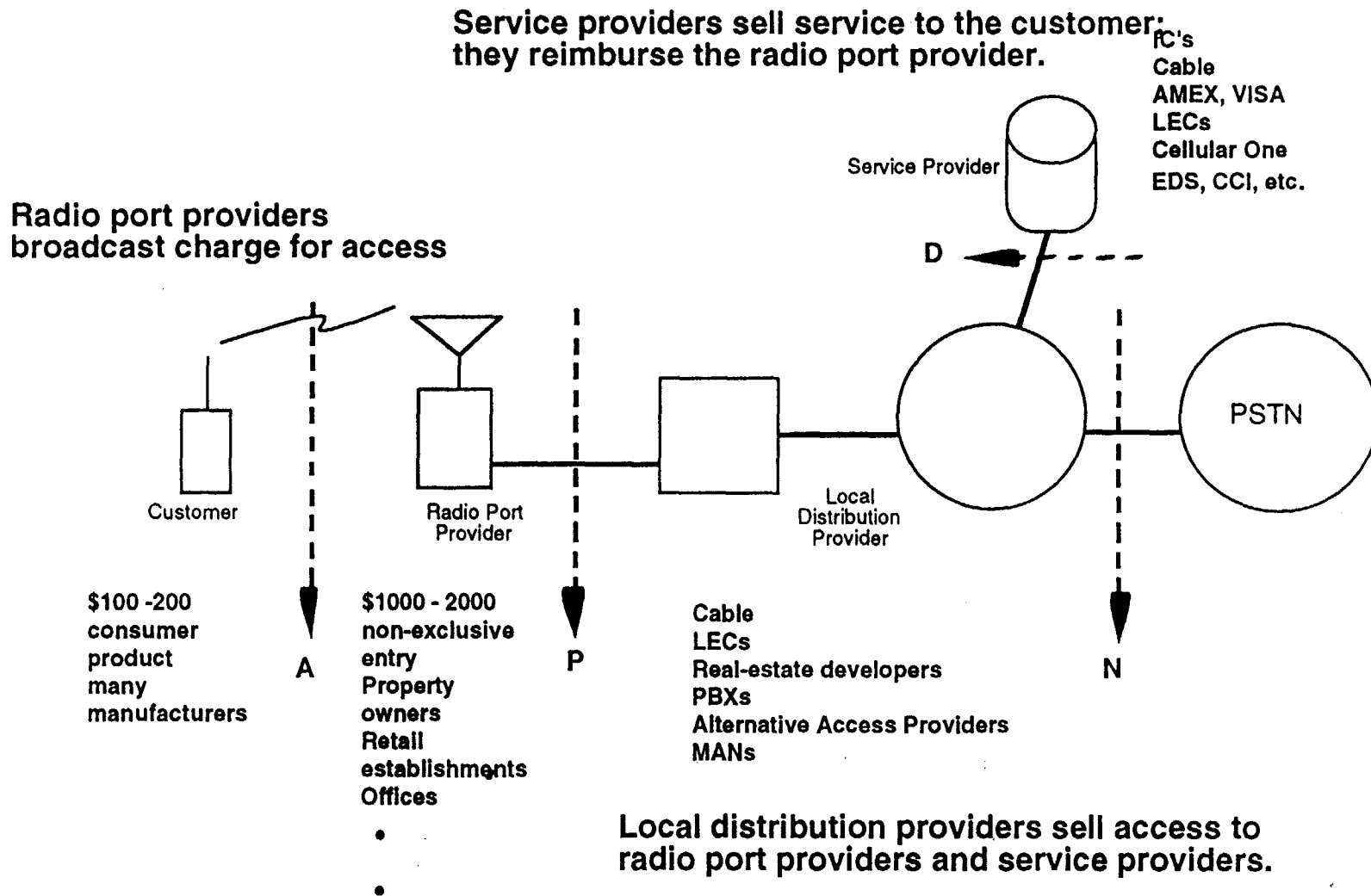


30 - 60 MHz

Architecture



Potential Players and Relationships



Commodity PCS and FCC Goals

- **Highest quality at low cost**

- Low power enables low cost high quality transmission with less spectrum

- **Reasonable rates to the greatest number of consumers**

- The mass market wants interoperability
 - Commodity markets promote competition and lower prices
 - Standards and open interfaces promote competition
 - Manufacturing economies of scale
 - Manufacturing process economies
 - Efficiencies from information flow
 - Fosters market specialization and niche market entry
 - Encourages innovation by assuring compatibility

Optimizing and Balancing Values

- **Universality**

- Commodity PCS enables market forces promote universality

- **Speed of Deployment**

- Measured by service to the customers
 - Post assignment aggregation costs
 - Concern for customers' stranded investment. Failures in the lab versus failures in the market
 - Commodity PCS may not be slow when compared with small licenses
 - Balanced against the long-run potential -- fastest way to achieve low power
 - Part 15+ satisfies deployment speed needs

- **Diversity of Services**

- Rely on Part 15+ for diversity
 - Encourage diversity through flexible standards and competition

- **Competitive delivery**

- PCS Competition
 - Cellular competition
 - Commodity PCS is cross elastic with the microtac market
 - Nothing precludes other allocations for high power service

Challenges

- **Commodity PCS requires the FCC to be pro-active in encouraging industry standards**
 - To encourage flexibility and diversity propose 3 levels:
 - Interference protection (an air version of Part 68)
 - Optional interworking (facilitate multimode designs)
 - Complete interconnection specs to the public service
 - Still may be quicker than small licenses
 - Greater success in the long run
 - Universality requires standards
 - FCC need not proscribe standards, just push the industry
 - Allocate other spectrum without standards.
- **Raises the transaction costs in buying-out incumbents**
 - Lower antennas and lower power makes sharing easier

Approaches To Licensing

- **Auctions**

- No authority

- **Comparative hearings**

- Cumbersome, litigious, and thus lengthy.

- **Lotteries**

- 50,000 Dentists can't be wrong
- Chooses the lucky player, not the best
- Applicants operate where they win, not where their business sense tells them to.

Licensing problems (applied to lotteries)

- **Small --**

- Licensing overhead (100 assignments per year)
- Roaming difficulties
- Post-lottery aggregation overhead
- Standards/universality issue

- **Large --**

- Large capital investment -- precludes potential players
- Heavy reliance on up-front consortia
 - Assumes the best sub-players get together and then assumes they are lucky enough to win.
- Arbitrary split -- doesn't follow communities of interest
- Market need for ubiquity pushes to high power
- If National, all the above +
 - Contentious, potentially litigious
 - If only a few there may be pressures to regulate
 - If multiple, faced with non-interoperable competing technologies